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THE JOURNAL OF PHILOSOPHY

PSYCHOLOGY AND SCIENTIFIC METHODS

THE FACULTY DOCTRINE, CORRELATION, AND EDUCATIONAL THEORY.¹ I

I. INTRODUCTION

AT a meeting of teachers in London recently, a prominent educationist expressed some dismay at the growing influence of psychology in education. For he said that he understood that psychologists, nowadays, had deprived us of our faculties. Personally, he felt that he could not do without his, and he thought that teachers would find it very hard to discuss and apply educational theory if they were no longer able to use such terms as memory, imagination, reasoning, *et id omne genus*, without being open to the charge that they were speaking of non-existent entities.

Let us at the very outset admit that "faculties" are explanations and are not necessarily causes. A fact is explained when we are able to join it up with similar facts in a common judgment. Such an explanation is not ultimate—probably no scientific explanations are—but it may have a pragmatic value; it may help us to handle the multitudinous happenings of our real world more economically; it may help us to draw conclusions of service for practise. We *must* conceptualize if we are to draw conclusions which in any way pass beyond the bare facts revealed by observation and experiment. Unrationalized perception leads nowhere. But, on the contrary, conceptions, to be valuable, must be full of the possibilities of perceptual content; they must start from facts and point the way to new ones.

We must, I think, further admit that the conceptualizing of early psychology was a process too easily carried out; and, in the first break-up of its merely classificatory doctrines, it was inevitable that the easy solutions of the past should be discountenanced and vigorously denied. It was inevitable that the increasing knowledge of the

¹ This paper was given in outline before the joint meeting of the Aristotelian Society, the Mind Association, and the British Psychological Society in London, 1910.

extreme complexity of mind should lead to a disbelief in the few simple unities which heretofore had largely done duty for accurate psychologic thinking. The reaction was largely for good, and we owe to it the development of latter-day scientific psychology.

Analysis is the keynote of modern work; but one can not draw useful conclusions from merely analyzed contents, we needs must put things together before we can use a science. It is therefore again an inevitable necessity, and no mere accident of personality, which induces the professors of experimental pedagogy to bind up, or try to bind up, the *disjecta membra* of experimental psychology into useful bundles. In carrying the bundles about they will assuredly lose a stick here and there, and some of the sticks will get into the wrong bundles; but the things simply can't be carried at all unless they are bound up somehow, and if they are left grounded where they lie they will be of no human service. It was, therefore, quite to be expected that Professor Meumann, the head and front of the offending, should be severely criticized by Professor Wundt for what he regards as the reintroduction of the faculty doctrine in psychology.

I hold no brief for the defense of the faculty doctrine, and I am against most of the educational inferences which have been drawn from it. But to overstate the case against it will produce a violent reaction when it is discovered that carefully conducted experiment may lead to a justification of some form of it—a form and a justification which will not sanction the errors of medieval pedagogy, but will give us hope that our mental training is not quite such an atomistic affair as the extremists of the opposite school assert. It is perhaps a little unwise, and I am not sure that it is not a little too early, to attempt a mediated view—we are not yet ripe for the synthesis of these contradictions. In attempting such a task, one has merely the doubtful consolation of knowing that one is likely to be criticized by both parties, and alas! one has no partisans.

II. THE FACULTY DOCTRINE AND EDUCATION

Probably no problem in educational psychology calls to-day more urgently for continuous and exact treatment than the relation between the various mental powers of school children.

I have used the word "powers" because I wished to avoid declaring, or rather, insinuating, any opinion at present as to what is known in psychology as the "faculty doctrine." Much more patient experimental work remains to be done before we shall be entitled to pronounce any confident opinion on all the problems—for they form a group rather than a single problem—which are raised in the attack and defense of this doctrine of the faculties.

This is not the place for any extended discussion of the various

psychological forms of the doctrine; indeed, some of the leading theorists of to-day are apt to regard the discussion as closed. But we can at once dismiss one aspect of the faculty theory, namely, that which explained our memories and our imaginings by postulating as causes a kind of separate mental organ or agency called *the* memory, and another called *the* imagination. Our philosophy of explanation has grown less naïve than it was when such postulations satisfied us.

But there is another aspect of the faculty doctrine which can not be dismissed in such a cursory way. According to that, a man with a good memory is a man who can remember, though, doubtless, with variations due to his greater or lesser interests in particular subjects, pretty much and pretty well anything he wants to; he can learn poetry, he can learn mathematical formulæ, he can learn dates in history, he can learn geography—he can remember both text and maps, and he can learn tunes (some of the defenders of the doctrine would feel a little hesitation on this count), and he can remember them all. If he is an imaginative person he can produce from among the things he knows new things which are psychologically original, that is, original from the standpoint of psychology, the individual standpoint. He may have learned stories, but he can write others which are in no sense mere repetitions of what he has learned; he may have learned to draw and remember the appearances of objects, but, as an imaginative draughtsman, he passes beyond what he has seen and learned. Indeed the ultra supporters of the faculty doctrine would maintain that he would invent better if he had not learned or could not learn to draw and remember actual objects. In mathematics such an one will tend to invent his own formulæ, in science he will frame his own hypotheses, and in music will make tunes for himself: all of which, *bien entendu*, need not be original except in the psychologic sense. Now it is fairly obvious here that we are dealing not with a single problem, but with a whole group of problems, and perhaps that consideration may appear more clearly and usefully to the student of educational psychology if I approach the questions from the educational side.

III. EDUCATIONAL THEORY AND MENTAL DISUNITY

Educational anti-facultists of to-day express themselves in ways which assert or imply some or all of the following propositions:

1. That there is little positive correlation or connection between the various memories and imaginations and reasonings which, as a sort of general aggregate rather than as generalized functions, constitute *the* memory, or *the* imagination, or *the* reason.
2. That there is a negative correlation between these faculties.

Thus, persons who are endowed with good memories will tend to be weak imaginatively and *vice versa*; and the cultivation or exercise of one of these powers will affect the cultivation of the other adversely. I use the double expression, cultivation or exercise, because I do not for the moment wish to prejudge the question as to whether *the* memory or *the* imagination can be trained, in the scholastic sense, at all. Professor James, we may remember, denied altogether that one could train the mere brute retentiveness which underlies all forms of memory.

3. That, while admitting that particular memories and particular imaginations can be trained, it would be held that there is no transfer of the results of training from one memory to another or from one imagination to another. They are quite specialized functionally and, further, they are specialized by content.

As this is a JOURNAL OF PSYCHOLOGY, the genesis of these views may be worth a moment's consideration.

First of all, they are due to the backward pragmatic test of truth. There is general dissatisfaction with the educational results of to-day which is felt by all or almost all educationists. It is held, therefore, that the views on which these results are based can not be true, for our educational practises have proved unsuccessful. Hence, therefore, the contrary doctrines are supposed to be the true ones.

Secondly, there is an increasing recognition on the part of educationists that psychology has something vital to say about the mental basis of education. They know that the leading English-speaking theorists of to-day have, with little exception, decided against the faculty doctrine; and they take that decision to mean (as it does not necessarily) that the above propositions are direct consequences of its overthrow. And, apart from this, the growth of experimental methods has tended to make the merely educational mind, and, shall we say, some psychological minds, conclude straightway that not only is the old causal unity—the synthetic unity of apperception—dissolved into uncorrelated and separate faculties, but that even these faculties are also broken up into quite unrelated parts.

Memory itself, which had a long run as a separate homogeneous function, is dissolved into visual memories, auditory memories, articulatory memories, memories of motor sensations, and so on.

And from the fact that a person *may* be good at one and relatively weak in another mnemonic form, it has been concluded that there is nothing left at all homogeneous enough to be called *the* memory. There is less difficulty with *the* imagination; we have always spoken of an imaginative person, but we have not usually been so clear as we have been in the case of memory that an imagina-

tive person was good all round at all sorts of imaginings. The "image" doctrine of imagination currently accepted would tend to further accentuate belief in the separate nature of the functional operations commonly held together in a loose concept with the help of the word imagination. For how, it would be argued, should a training of visual images help us to form auditory ones?—and so on.

Issuing from all this logically, though genetically, I believe, only appealing to it for support, is the enormous trend in favor of practical education, the decline of the classics, and some others of those movements one knows as modernism in education. For, if these propositions be true, we can educate a child in particular functions only: if we want him to grow up with powers of imagination we must make most, if not all, of our school exercises of an imaginative kind: memorizing will be obstructive or at best nugatory, and reasoning will not help us. Or if we want him to learn from the work of others to become adapted to his environment, to frame his inner relations in accordance with outer ones, we must set him to observe and remember; imagination with such ideals being reduced in name and fact to phantasm or fancy. Indeed, the educationist often goes further, as logically he ought to do, on these premises. Not only is the cultivation of the separate faculties, *e. g.*, memory and imagination, believed to take place without interpretation and even with adverse influences one on the other, but the separate memories and the separate imaginations must, if we require to improve them, be cultivated in the form in which they are hereafter to be exercised; for there is little or no transfer of improvement gained in one particular function to any other whatever, even to those which, according to the older faculty psychology, were regarded as practically identical with it, and were called by the same name. How *can*, one would say, the memory for dates help the memory for chemical formulæ, the memory for pictures help the memory for tunes, or how should practise in imagining interesting stories help a child to imagine new designs in draughtsmanship? I admit the extreme difficulty in answering these questions satisfactorily, even if experiment should show that one function does help the other.

The general line of argument is further supported by well-known facts drawn from adult psychology. Jones is a highly imaginative person; his reasoning we believe weak—his conclusions do not agree with our own; and he does not know the facts we appeal to; we shrewdly suspect his memory to be faulty. Brown, on the other hand, reasons beautifully; but he never remembers facts and has no imagination. Robinson is full of facts, but he is a stodgy person who can not reason on them nor throw them into combinations different from those in which they were originally experienced by him.

And we do not wonder at these things; for Jones is an artist, Brown was educated in logic and metaphysics, and Robinson is the unfortunate product of an encyclopedic curriculum punctuated plentifully with examinations.

These are people who, if they were arranged in the order of their proficiency in mental powers, would be placed very differently according as we choose memory, imagination, or reasoning as the basis of our differentiation. Robinson, for example, would stand 1st for memory and n th for reasoning or imagination, at least so common sense supposes.

Nor is it merely a common sense opinion unsupported by philosophers and psychologists. We may remember Sir William Hamilton's essay on the study of mathematics as an exercise of the mind, and Herbert Spencer's appraisal of mathematicians balanced by his estimation of the defective reasonings of men of science. They are supposed to be exclusively devoted to particular types of reasoning and hence to be unable to reason in any other way. Their faculty of reasoning is not only no faculty at all, but is divided against itself in such a way that the cultivation of part of it militates against the operation of the other part. I append the following quotation to show that I have not strained the argument involved in Spencer's essay.

This instancing of five men, occupied with mathematics and mathematical physics, in whose minds the formula of Evolution raised no answering conception, may be thought to imply an undervaluation, if not even a reprobation, of mathematics and physics as subjects of study. No inference could be more erroneous. To guard against it, however, let me point out that while exclusive devotion to the exact sciences produces certain defects of thought, exclusive devotion to the inexact sciences produces defects of thought of an opposite kind. These last present phenomena under such complex forms, with interdependencies so involved, that necessities of relation can not in most cases be said to exist; and the many causes simultaneously in operation so obscure the action of any one, as in large measure to exclude the idea of definite causation. Among plants a few fundamental relations may be fairly alleged, as between the monocotyledonous germination and the endogenous mode of growth, or between the dicotyledonous germination and the exogenous mode of growth. But relations among multitudinous combined traits, such as kind of fructification and possession of thorns, or hard-shelled nuts and shapes of leaves, can not be shown to have any causal characters. So with animals. Though it is a trait of creatures having mammæ to have seven cervical vertebræ, yet for this correlation of structures no necessity can be alleged; as is proved by the fact that though at one time the connection was supposed to be universal, there have of late years been discovered mammals having eight vertebræ in the neck. Hence, those who exclusively study animals and plants, being perpetually impressed by connections of facts which are either fortuitous or for which no reason can be assigned, are not daily habituated to the perception of causal relations, and such generalizations as they can establish come to be regarded as empirical. A purely inductive habit is encouraged and a deductive habit discouraged. The resulting mental tendencies operate

in other regions of thought, so that everywhere necessity of relation is doubted, and the idea of inevitable consequence meets with no acceptance. Many times in a distinguished biologist I have observed the effect thus described. Present him with a great accumulation of evidence supporting a certain conclusion, and this conclusion, coming before him under the form of an induction, he would entertain and seem ready to accept. After a time point out that this conclusion might be reached deductively from known necessary truths, and immediately his scepticism was aroused. Forgetting the inductive basis originally assigned, the deductive proof excited such repugnance as tended to make him reject what he before admitted. The habit of mind encouraged by dealing exclusively with empirical generalizations produced an abnormal distrust of all others.

As I intend, finally, to deny the validity of educational arguments drawn from such evidence, I ought to say at once that such a method is inevitable at a certain stage in educational theory, and that it is the first and obvious way of attack may be shown by listening to any conversation among scientific men when they are "off" their own particular line. Bearing in mind the evils as well as the good which we believe to be derived from each study in its highly specialized form, we have forthwith agreed that a modicum of the same studies will, in youths and children, produce similar effects, though proportionately smaller, of course. Hence we ought to teach that, and should not teach this, and so on. A first-rate mathematician is said to be weak in adding up sums; hence accuracy is not necessary for school children, they can become great mathematicians without it. A great literary man had a poor memory, and was not always sure of his spelling; so that good spelling need not be insisted on in school, even for subsequent success in literature. A great scientist used few books, he owed his knowledge to first-hand perception without guidance from others. Now perception is a separate faculty, called by pedagogues the faculty of observation; hence we must, in order to produce scientists, confine the youthful mind to nature study of a direct kind. These arguments are everywhere current among educationists either explicitly or implicitly. Shall we cease to argue thus? By no means; we must and ought to argue from the cases we know. But we ought to know more cases. We must admit that such persons exist; but before drawing conclusions from their psychology to ordinary educational practise, we must ask, Are they normal adults?

Can we best find psychological direction in the study of abnormal cases, whether they be found amongst men of genius or in lunatic asylums? It is known to be extremely dangerous to make general inferences from the extreme ends of any psychological scale; some of our best attested correlations give way at the edges. Even in so simple a matter as the relation between temperature and volume of water, we should be deceived if we trusted to a kind of rule-of-three

conclusion. For we find by experience that there is a peculiar break at 4° Centigrade: after continuously shrinking with falling temperature, the liquid at this point begins to expand. The relationships between our various mental powers are, doubtless, at least as complex as that between the temperature and volume of water. Indeed, we need not argue by analogy that they are so. It is well known among those who work much in the correlation of mental functions that, towards the limits of the series, the correlations may be even reversed, and mathematicians caution us against attaching too much importance to the cases on the edges of series; it is, in fact, a complaint against the world-known Pearson formula of correlation that it allows too much weight to the extremities of the series correlated.

It is obvious that, until we have established correlations and connections all along the scale, which are *generally* true, we can draw no valuable conclusions for practise of any kind. This work is, fortunately, in process of being done. Our every-day outlook is always towards limiting cases, because these are striking and noticeable. That they were also misleading we scarcely began to suspect before experimental psychology began its investigations on adult professors and students who were accessible to laboratories.

But may we then draw inferences which shall be valuable in ordinary pedagogy? No, not even then; for children are not adults; they are not even miniature editions of adults. They differ in ways which are vital for educational theory and practise. If the above line of argument is sound, it conducts us directly to observations on normal children as the only way of obtaining real guidance for pedagogy.

IV. EDUCATIONAL THEORY AND MENTAL UNITY

But pedagogy, like more established sciences, and especially like those which oscillate between a normative and normal condition, is by no means a solid body of consistent doctrine.

The views of the school to which I have hitherto referred all tended in the direction of reducing our belief in the unity of mind: its members disbelieve in the faculty doctrine because they do not believe that the processes referred to generically as those of one faculty are, as a matter of fact, in direct positive correlation and connection with each other; they accept the faculty doctrine in so far as they maintain that the improvement due to the exercise of one faculty is not transferred to work undertaken by another. In so far as the faculty doctrine is a doctrine of separation, they subscribe to it; in so far as it is a doctrine of unity and combination, they deny it. But the doctrine is attacked, not only because it is considered to

regard the mind as too much of a unity, it is attacked by another school because it ascribes too little unity to the mind. This school holds that the various mental powers are of course highly correlated, so highly that it is absurd to talk of disparate powers or faculties at all; the work of finding correlations between mental powers seems to them a *παρεργον*. I merely mention *en passant* those who believe that mental life can be quite adequately pictured as the synthesizing activity of a unitary soul or subject, since this view is not active to-day as a basis of psychological investigation, however stoutly it may hold its own in the metaphysical field. There is probably a truth underlying the view which few psychologists of sensation have yet allowed for, namely, the necessary and inevitable participation of the subject or reagent or agent, as I should prefer to call it, in every fact of knowledge.

But this participation can be shown only by doing, and by doing definite and conceivable things. These activities are many and multi-form, it is said, and rightly so. But it is further implied that they may all be summed up in a few fundamental categories, to wit, discrimination, comparison, association. These, *bien entendu*, are not new faculties, they are elementary processes or principles of processes which can be, and are, employed in the operation of the various so-called faculties, perception, memory, imagination, reasoning, etc., and, moreover, can be, and are, employed in various fields of knowledge. If well employed in an imaginative field, they will result in fertile imagination; in a mnemonic field, they will result in accurate and permanent memory. Consequently, if we set the same individual various tasks involving processes of memory or imagination, he will, as compared with other people (my reader will remember the fertile methods of correlation by rank) tend to do about equally well in these different tasks. Why? Not because his memory and imagination are the same thing exactly, but merely because he applies, or may apply, his discriminative, comparative, and associative powers equally in all these cases.

So that the labors of experimental inquiry are undertaken in vain, the correlation found *must* be high. If one points to the well-known cases, above cited, of Jones, Brown, and Robinson, one is fairly answered that the doctrine does not require that each person shall, as a fact, be equally strong in memory, imagination, etc., but only on condition that he had applied his powers of discrimination, comparison, etc., equally; that is, had given equal attention to mnemonic and imaginative subjects. Logically, one sees that imperfections would tend to be thrown on *the* attention, and a perusal of experimental work tends to show that this has, in some cases, actually occurred.

Opponents urge that the power to attend to any one set of mental processes, at least continuously, must depend upon large native endowment for that particular function. The education of the attention is ruled out as the only factor of difference, since the power to attend to different processes differs initially, that is, before a process of training has come in. It is a difficult position, since we have no exact methods of separating the attention factor in the result from the factor due to the natural endowment for the work in question. For example, one boy does arithmetic well with little attention; another may attend carefully, and fail. "Yes, we know that," we may answer, "but we can get over that difficulty by comparing the work of the same boy only with his own work of the same kind and difficulty done at different times. The difference will give an indication of the waxing and waning of attention." "No," it is answered, "the power to perform the process varies, quite apart from the attention given to it; it waxes and wanes from various causes other than the failure of attention, from lack of nutrition, from practise, from fatigue, and so on." Extremists go further, and imply that attention to any process is simply an indication of the ripeness and fulness, so to speak, of the organs or other parts, neurological or otherwise, which are physiologically involved. There is much to be said for this view, were we considering *spontaneous* attention merely; but common experience uses the term attention to denote those cases in which, notwithstanding our known weakness, our felt fatigue, we force ourselves to attend, as the phrase goes; and we believe that we can thereby raise the results of work which is issuing from a rather used-up power. Of course, it is not pretended that attention can increase the work from an organ quite fatigued; indeed, it seems to me that, theoretically, we might define fatigue as indicated by a falling-off in the power to perform some process which additional activity of attention could not prevent. Practically, with the exception of those who believe they are measuring differences in the power of attention by means of experiments which actually measure work done, what actually happens among good experimenters is something like this: Every precaution is taken to secure all the possible attention of which each subject is capable on every occasion on which the tests are made. We say frankly when we are dissatisfied with the attentiveness of an observer—we often are when his results are jerky—so we speak out so as not to mislead our readers and, incidentally perhaps, to preserve the conclusiveness of our own results. So that the theoretical test I propose is one already implicit in good practise. I have ventured apparently off the track, but the discussion is necessary to justify procedure in which tests are made of mental functions, for otherwise it might be alleged that one is measuring merely

different states of attentiveness of the same subject, and nothing else.

Much of the above argument seems abstract and metaphysical, and some would think it absurd to suppose that practical or even theoretical pedagogy has been much influenced by considerations of the unity of mind. To instance Herbart would only be to mention a case in which the same man's pedagogy and metaphysics were far asunder. For whilst he postulated a unitary soul or subject, he gave most admirable instructions pedagogically as to the way in which to produce a unified mind which, *ex hypothesi*, he started from as an original possession. But there is a school of educationists who do believe in unity; they assert that the results of the faculty doctrine are pernicious, and that, *a fortiori*, the views of those who think that the faculty doctrine itself implies too much coherence in mental life are more pernicious.

The training of the faculties—a *façon de parler* beloved of pedagogy—is for them a myth. The whole mind hangs together. (Some of us wish it would hang together for the space of one article; our own minds, do I mean? Yes, and those of our readers?) Practise in any mental function means for them improvement all round, if it means improvement at all. Consequently, all pedagogical exhortation which recommended this or that particular study as specially suitable for improving some particular mental power, *e. g.*, that to train a boy's reasoning powers (the faculty doctrine calls it *the reason*) we must teach him arithmetic, or demonstrative geometry, or grammar, is thereby at once placed out of court.

If the whole mind is the unity which these thinkers profess it to be, mental pabulum is useful for its general effect rather than for its special value in training special powers. The apostles of the training theory are easily ridiculed when, in answer to the charge, for example, that the public school boy never really learns to know Latin or Greek, they point out the magnificent effects which these studies have as mental discipline. *Les extrêmes se touchent*. The believers in the complete unity or in the extreme disunity of mental functions meet on common ground. The matter of education becomes everything, the method nothing. If we can not develop mental powers and transfer the effect from one subject of instruction to another, we must aim obviously, as far as we can, at giving instruction in the very knowledge, and practise in the very activities, which the adult will probably want to know and do; we shall not teach him Latin verse to improve his taste for the English poets; we shall not teach him Euclid (pardon; demonstrative geometry, I mean) to help him to reason about the affairs of his business life; he must, in very truth, begin his life work young, and it is futile to suppose that, by any artificial arrangement of

knowledge specially prepared for school purposes, we can give a pupil a special dose of memory training, reasoning power, or fertility of imagination. All the training really possible or necessary will come incidentally in the acquisition of knowledge which is valuable for its informatory and not for its disciplinary effect. Pedagogical method *may* still be valuable, but it will be a method of presentation merely, not a method which puts practise and training before the acquisition of fact.

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RHYTHM AND THE SPECIOUS PRESENT¹

A SATISFACTORY working hypothesis for the study of rhythm-perception has not yet been formulated, although several writers have come very close to the statement of the theory which seems to me adequate. That there is need of a new hypothesis is evident to any one who takes the trouble to go over the experimental literature dating from Bolton's paper.² The impression which one gets from this literature is that the psychologists are well aware that rhythm-perception presents a big problem, but are at sea as to the steps to be taken towards the solution thereof. An interesting light is thrown on this situation by the case of a German writer who is much quoted on the subject of rhythm-perception, and whose article of over a hundred pages was presumably preliminary to an account of extensive experiments of his own. The "Fortsetzung folgt" which concludes his second instalment remains an unkept promise, and there are certain things which indicate that he was unable to handle the experimental problems, that the undertaking was too much for him.

Introspective work has convinced me that the perception of a rhythmic grouping or series is conditioned by a periodic change in the specious present. When a series of stimulations (auditory, for example) runs off without any decided rhythm or grouping, the specious present maintains an approximately fixed length, or, at least, the variations in its length have no functional relation to the series of stimulations in question. Sensations appear serially, remain for a greater or less time in "present" consciousness, and fade out one by one. When the sensations begin to group rhyth-

¹ Presented, in part, at the Chattanooga meeting of the Southern Society for Philosophy and Psychology, December 28, 1910.

² "Rhythm," *American Journal of Psychology*, 1894, Vol. VI., pp. 145-238.